INDUSTRIAL STANDARDIZATION

Formerly ASA BULLETIN

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SEP 19 1932

A MONTHLY REVIEW

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Published by the

AMERICAN STANDARDS ASSOCIATION

OLUME 3 SEPTEMBER • 1932 NUMBER

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29 West Thirty-Ninth Street New York

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The American Standards Association is organized to provide systematic means of cooperation in establishing American Standards to the end that duplication of work and the promulgation of conflicting standards may be avoided; to serve as a clearing house for information on standardization work in the United States and foreign countries; to act as the authoritative American channel in international cooperation in standardization work

The Importance of Standardization in Periods of Depression[1]

by

Dr. Otto Kienzle, *Consulting Engineer*
Berlin, Germany

A discussion of types of standardization which should be promoted by industrial management during the present period

Standardization always has meant working for the future. Money spent on it is, therefore, to be considered as invested capital. As compared to money invested in material goods, standardization has the great advantage that it does not require any expense for upkeep and is not subject to depreciation. Consideration of these cost items, therefore, shows at once that any standardization work carried out on a sound economical basis must bear fruit, especially in times like the present.

Justification of standardization during times of depression involves the question of how far it is effective and wise to continue to do standardization work and to spend money on standardization under the present conditions. It is worth while, therefore, briefly to review here in what respects standardization is justified at the present time.

The economic advantages of standardization are known to be: simplification of design; larger production lots; simplification of the tool room; smaller stock; and easier check on supplies.

Simplification of design

Through well-devised standardization, the design of a machine, including detailed drawings, would comprise 15 to 25 per cent less sheets, this reduction being due to the fact that a number of parts would be given on standard sheets. A saving is therefore made in drafting work and cost of manifolding. Furthermore, since each machine part also requires routing, calculation, design of jigs and fixtures, etc., all of the clerical work relative to these items is also saved. If no "standard" part, properly speaking, can be used, similar savings are made if previously designed parts are used again without change, these being recorded in the part list with their old numbers.

These advantages are shown very strongly in the production of equipment and machinery, where drawings for a still higher percentage of items are made superfluous by well-organized standardization. If, for example, the AWF sheets[2] for punches and dies are used, the "design" can be limited to drawing the punch and die and indicating the dimensions controlling their assembly in the punch and die holders. The remaining parts, often no less than 85 to 90 per cent of the total, are standardized.

Not only the standards for component parts, but also the more complicated standards, result in considerable simplification in the work of the designer. We have in mind, for example, the standardization of rotary speeds (rpm) which brings about a considerable simplification in the design of gear boxes for machine tools, so that all trial and error computations with different steps in speed are eliminated. In fact, by choosing one of the standard series of speeds, the designer knows what the different speeds will be even before a single line of the drawing has been put on paper.

The more the turnover is reduced and the smaller the production lots accordingly become, the more important becomes the increase of production lots through standardization. The increase of the size of a lot from 10 to 20 pieces gives a larger saving per piece than the increase of the lot from 50 to 100 pieces. This may be explained by the share of the indirect labor cost for each lot (clerical work, management, setting-up time) which is explained by the diagram in Figure 1. This shows, added in vertical direction, the cost of material (M) plus direct (productive) labor cost (L); the general overhead (not including indirect labor cost) (U_1); and the indirect labor cost per lot (U_2). The saving in manufacturing cost per piece amounts in one case to $E_1 = 29$ per cent ($A - B = E_1$); in the other case,

[1] Translated by John Gaillard, mechanical engineer, American Standards Association, from an article published in *Werkstattstechnik*, Berlin, Germany.

[2] AWF is the symbol for the German Committee on Economy in Manufacture (Ausschuss fuer Wirtschaftliche Fertigung) which publishes recommendations to industry in the form of sheets and pamphlets.

this saving is $E_2 = 11$ per cent (manufacturing cost $C - D = E_2$). (This diagram should not be confused with the degression diagram of the manufacturing cost of an entire plant.)

An important conclusion may be drawn from

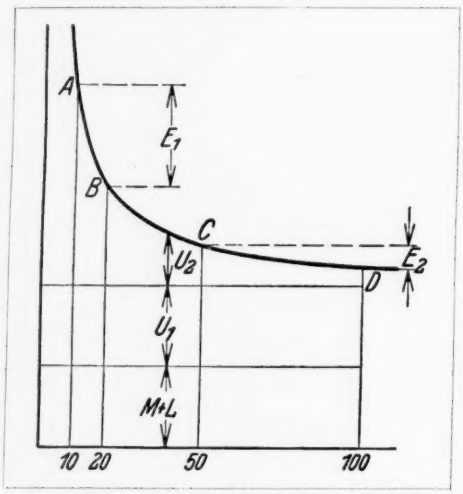

FIG. 1

Share of general overhead in manufacturing cost

The ordinates represent manufacturing cost per piece and the abscissas number of pieces per lot

these facts in regard to times of depression. In carrying out standardization, we realize that a definite graduation in sizes may lead in certain cases to a seeming waste, since the designer, instead of being able to adopt the size directly resulting from his computation or design, must use the next larger standard size.

It is now claimed that during times of depression the graduations must be coarser; that is, that the number of sizes in a given series of standard parts must be still more reduced than before. (*Example*—Parts with metric thread should be coarsely stepped in diameter, as: 10, 14, and 20 mm; instead of finely, as: 10, 11, 12, 14, 16, 18, and 20 mm.) This is explained by the diagram in Figure 2. The full drawn lines here indicate, in the same way as in Figure 1, the component cost factors of the manufacturing process for finely graduated standardization. The broken lines indicate the same cost factors in coarsely graduated standardization for which the combined cost of material and direct labor ($M_g + L_g$) is larger by an amount V, while the next larger standard size lies farther away from the size required solely on account of design, and therefore indicates a "waste" that is larger by an amount V.

If, therefore, in times of depression the need for a standard part is increased by shifting from a finely graduated standard series (B_f) to a coarsely graduated one (for example, by leaving out every second size), a shift is made from the point of manufacturing cost A to point B, resulting in a saving $A - B = E_3$. If the same thing had been done in normal times by shifting from the lot size B'_f to the coarse gradation B'_g, when a larger number of the same piece was needed, this would have resulted in an increase in cost $C - D = M$.

The following rule may therefore be adopted: In times of depression, make the steps as large as possible.

Simplification of the tool room

It has always been the duty of the engineering department to check every design to determine whether as few as possible bolt-hole diameters, fits, tapers, etc., are used. Under present conditions, such a check is still more necessary, and in this connection the use of standards is particularly advantageous. When the draft of a design has been completed, it is useful to record in a list of basic

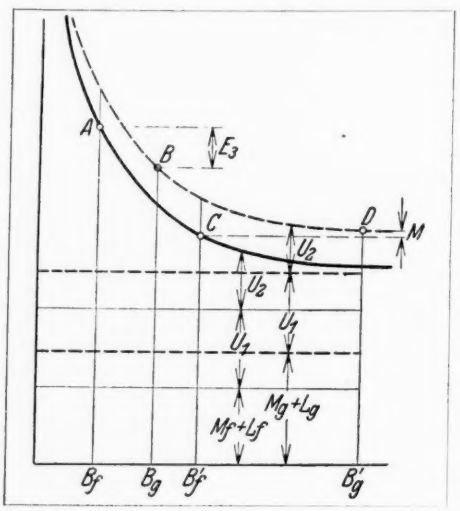

FIG. 2

Advantages of coarser steps in standard series

The ordinates represent manufacturing cost per piece and the abscissas number of pieces per lot

standards[3] all standards on which specific tools carried by the tool room are based. All dimensions lying closely together are then merged, or certain dimensions which appear in the design only once

[3] A copy of a typical list of basic standards, which was reproduced in the original article, is available for loan through the ASA office.

are replaced by others that appear more frequently. In doing this, consideration is given to the tools and gages available, so as to utilize these more efficiently and to avoid, as much as possible, the purchase of new tools and the consequent investment of capital.

Reduced stocks

Under present conditions there is hardly any measure more important than the reduction of stocks, as this often offers the only opportunity of getting the necessary supplies from the stores of the company. From this point of view, a particular advantage lies in the fact that in previous years the number of various kinds of items has been considerably reduced through standardization. Still, this has not been done on a large enough scale, especially where semi-finished products are concerned. For example, the mills manufacturing precision tubing suffer very greatly through the fact that certain customers still ask for the oddest dimensions. This shows that the establishment of general trade and industry standards should not fall off now in comparison with the establishment of company standards, but that, on the contrary, the general kind of standards should be promoted very energetically, under the pressure of present conditions. Resistance that existed before is now greatly weakened on account of economic pressure.

A special advantage of standardization is found to lie, in regard to parts made to DIN (German national) standards and to trade standards, in that the individual plant is able to restrict the size of its purchases to the greatest possible extent because standard parts are supplied by their manufacturers from stock. The manufacturers of these parts, in turn, are able to reduce the stock previously kept to satisfy their customers, reduction in variety making it possible for them to do so. Also they can propose with greater emphasis the replacement of special parts by standard parts, the difference in price between the two being greater when the order lots are small.

Easier control of supplies

The ordering of standard parts is much simpler than the ordering of other parts, as the purchaser need not send a drawing and the supplier need not ask any questions. Still more pronounced is the simplification in the processes of supplying and of supply control. The check made by the supplier does not require any special looking up of drawings, nor does it require special gages, and consequently no special preparations, but it takes care of itself as a matter of routine. The acceptance inspection check by the purchaser is also much simpler. This also applies to parts which, properly speaking, are not standard parts, but which have certain standard dimensions (screw threads, fits). In this case, also, the use of standard gages facilitates inspection. Moreover, there is much less occasion for rejections, as the standard symbols—for example, for screw threads and fits—indicate exactly what is to be supplied, while, on the other hand, in "non-standard" drawings odd threads, dimensions without tolerances, etc., continually lead to controversies. Briefly, in ordering to a standard, a postcard is sufficient, whereas in ordering non-standard parts, voluminous documents may have to be written out.

It is safe to say, therefore, that the capital which the German nation as a whole and the companies individually have invested in standardization bears ample fruit during the present period of depression and the results fully meet all expectations.

However, the standardization work in general has not been completed, and the individual companies show great differences in the extent to which general standards have been introduced and company standards developed. The question arises, therefore, whether during the crisis further investment of capital in standardization is justified. The considerations given above may serve as a guide in answering this question. The elaboration of the finer details of the standardization work now in course of development can no doubt be postponed under the present circumstances in order to save cost. In doing this, however, it should be fully understood that, although it is really contrary to the economical development of the organization, this measure is taken under the pressure of present conditions simply because the financial means now available must be used for purposes that are even more important than standardization. In general, however, the situation is exactly the same as it is with other kinds of investments. If it is known that an investment in standardization will pay for itself in a very short time (one-half to one year), on account of reduced cost, such standardization should be carried out. Because of the merging of stocks, there is often an opportunity now to carry out a piece of standardization work that hitherto has been postponed on account of the fact that parts of the old design were still available. In such a case, standardization should not be delayed under any circumstances, as the benefits will be reaped very soon, as we have seen above. The fact that standardization work now in course of development in the German national standardizing body and in the trade standards committees should not be interrupted but should even be speeded up in part has been shown by the example

of drawn precision tubing referred to above.

Standardization changes with progress in workshop methods, and it should, therefore, keep abreast of this progress. However, the introduction of new kinds of tools presents an excellent opportunity to prevent excessive waste by developing simple company standard sheets.

We do not know how long we shall have to continue to cope with the present restricted activities; therefore, the following principles may serve as a guide to the development of standardization during the period of depression:

1. In designing, standardize in all cases to a higher degree than before. (Use basic standards and standard parts.)
2. Introduce all standards published by the German national standardizing body (with the well-known safeguard that standards are to be introduced only after all stock parts have been used).
3. Adopt, within the company, coarser steps in finely graduated standard series, by using preferred numbers.
4. Develop new company standards in cases where the depleting of old stock presents an opportunity to do so.
5. Promote the use of the most important German national and trade standards.
6. Cancel, temporarily, those refinements in standardization which can be postponed; carefully note all cases in which standardization under normal conditions appears to be appropriate. A program of standardization thus prepared will be more valuable, although its execution is postponed, than the undertaking of the work at the present time under unfavorable conditions.
7. The following might be adopted as a general rule: Since at the present time we live on the capital of standardization and derive vitality from it, we should, in spite of all difficulties, also think beyond the immediate future and prepare ourselves on a smaller scale for the highest possible capacity of production.

Annual Safety Congress Will Meet in October

The Twenty-First Annual Safety Congress and Exposition will be held in Washington, D. C., on October 3-7, under the auspices of the National Safety Council.

The program will include sessions on safety in the following industries: automotive, chemical, construction, railway, metallurgy, mining, paper and pulp, petroleum, cement and quarry, refrigeration, rubber, textile, woodworking and lumber, meat packing, tanning and leather, machine shop.

There will also be sessions on street and highway traffic, industrial health, fire prevention, home safety, child education, and governmental relations.

The subjects of many of the projects under ASA procedure will be discussed during the sessions of the Congress. These include safety provisions for elevators, dumbwaiters, and escalators; construction work; the construction, care, and use of ladders; methods of recording and compiling accident statistics; prevention of dust explosions; installing and using electrical equipment in mines; street traffic signs, signals, and markings.

Dr. P. G. Agnew, secretary of the American Standards Association, will speak on "Safety Codes as Tools of Industry" at the session on Governmental Relations on Friday morning, October 7.

Tentative arrangements have been made for meetings of the Safety Code Correlating Committee, the Sectional Committee on Safety Code for Construction Work (A10), and the Sectional Committee on Manual on Street Traffic Signs, Signals and Markings (D5) in connection with the sessions of the Annual Safety Congress.

New Pamphlet on Safety in Household

A valuable new pamphlet, "Safety for the Household," covering one of the most difficult fields of accident prevention work has just been issued by the U. S. Bureau of Standards. The pamphlet supersedes the previous publication on this subject issued by the Bureau in 1918. The pamphlet points out that of nearly 100,000 fatal accidents occurring in the United States each year, from one-quarter to one-third occur in the home. Accident hazards may be due to faulty construction of stairways or other building details, or they may be due to faulty equipment or materials or improper maintenance of equipment. The pamphlet deals chiefly with hazards due to equipment and materials. There are sections on mechanical hazards, fire hazards, gas hazards, electrical hazards, lightning, and miscellaneous hazards such as paints and varnishes and cleansing materials.

The pamphlet may be obtained directly from the Superintendent of Documents, Washington, D. C., or through the American Standards Association.

Imperial Economic Conference Urges Standardization to Promote Trade

The important role that industrial standardization is expected to play in helping to bring about increased trade between the Commonwealth countries of the British Empire—the goal of the trade agreements arrived at during the Imperial Economic Conference in Ottawa, Canada—is indicated in the emphasis placed upon the subject in the report of the Committee on Methods of Economic Cooperation. Nearly one-third of the summary of the report is devoted to the subject of standardization, and definitely recognizes the importance of industrial standardization in promoting trade between different countries.

The serious consideration given the subject of standardization during the Imperial Conference is particularly noteworthy since it is the first time that the heads of so many countries have had brought to their attention thus forcibly the value of standardization in relation to trade development.

The report places considerable emphasis upon the necessity for cooperation between the national standardizing bodies. It not only makes recommendations for the development of national standards and the circulation of such standards between the various countries, but also it recommends that "there should be machinery for liaison between Commonwealth standardizing bodies in order to facilitate cooperation and consultation."

There are at present active national standardizing bodies in Great Britain, Australia, and Canada; one is in process of formation in New Zealand; and there is a cooperating committee in South Africa.

Following is the official summary of the report of the Committee on Methods of Economic Cooperation on Industrial Standardization and Grading and Standards of Agricultural Products:

Recommendations Re Industrial Standardization

1. To assist coordination of the work of national standardization, the following principles should, as far as possible, be observed:
   (*a*). Specifications should be in accordance with the needs of industry.
   (*b*). Community of interest of producer and consumer should be maintained.
   (*c*). Specifications should be arrived at by general consent.
   (*d*). Periodical review and revision.
   (*e*). Circulation of information re initiation and development of new specifications.
2. Having regard to the disadvantages which occur when a statutory provision embodies a standard specification verbatim, each government of the Commonwealth, in cooperation with its national standardizing body, should bring under review the position with regard to such statutory provisions.
3. The governments should give favorable consideration to providing free entry to specifications and other documents circulated between the national standardizing bodies.
4. Each national standardizing body should consider the issue of a standard schedule of colors.
5. To promote intraempire trade in steel, timber, industrial chemical products, and replaceable parts of agricultural implements and machinery, the parts of the Commonwealth affected should endeavor to take immediate steps to secure adoption of commercial standard specifications.
6. Cooperation with regard to standard specifications for aircraft materials and component parts, and particularly the method of testing, is urged.
7. There should be machinery for liaison between Commonwealth standardizing bodies in order to facilitate cooperation and consultation.

Grading and Standards of Agricultural Products

(*a*). In accord with the resolution which was passed by the research committee of the Imperial Conference, 1930, Commonwealth countries should work toward the adoption of uniform standards for those agricultural products which most readily lend themselves to standardization.

(*b*). It has been suggested that, in view of the great importance from the producers' standpoint of maintaining public confidence in a product, it would be helpful if the United Kingdom Government would legislate to require all wholesale trade in suitable commodities (*e.g.*, eggs) to be conducted on the basis of Commonwealth standards. As important questions of policy and administration are involved, this proposal should be further explored.

(*c*). In order to facilitate the unification of Com-

monwealth grade standards, arrangements should be made for the exchange of memoranda describing in detail the grade standards of the British Commonwealth.

(*d*). Standard containers—the standardization of containers is desirable and should be made the subject of further study in conjunction with the program of unification of grade standards.

Report of A.I.E.E. Standards Committee

The following report was recently submitted by the Standards Committee of the American Institute of Electrical Engineers to the Board of Directors of the A.I.E.E.

During the past year, the Standards Committee has been engaged chiefly in matters of coordination of going projects and revision of existing standards. In the development of new projects the committee has depended almost entirely on the technical committees of the Institute and through them there has been presented a number of revisions of existing standards, one new project Electrical Recording Instruments, and a subcommittee of the Standards Committee has developed a proposed Standard for Relays. One feature of particular interest during the year was the publication of a report on a proposed Test Code for Transformers, which it is expected will be followed by test codes now being developed by the Committee on Electrical Machinery for other types of apparatus.

Standardization work in cooperation with the American Standards Association has developed rapidly. The plan for coordination of standardization activities in the entire electrical field, which was fostered by the Institute and calls for centralization in the Electrical Standards Committee, actually got under way in a meeting of October, 1931, at which the Electrical Standards Committee superseded the Electrical Advisory Committee. The Institute continued its representation on some thirty sectional committees, acting under the auspices of other sponsor organizations, and holds sole sponsorship for eight projects and of a number of joint relationships. With regard to the joint sponsorship projects, it should be noted that there is a very definite tendency to urge that such undertakings be placed under the sole sponsorship of the Electrical Standards Committee and in certain cases the Institute has agreed to this on recommendation of the Standards Committee.

Another trend now in evidence is indicated in the consolidation of sectional committees whose scopes cover closely related types of apparatus. Both of these movements, it is hoped, will tend to expedite work which has been slow in developing, largely because of the complicated procedure involved in plural sponsorships and will also economize in the man-hours required to carry on the work. A number of sectional committees under A.I.E.E. sponsorship or joint sponsorship have submitted reports for approval to ASA, notably Mercury Arc Rectifiers, Scientific and Engineering Symbols and Abbreviations and Insulated Wires and Cables. The report on the proposed American Standard for Abbreviations for Scientific and Engineering Terms which has been under discussion for some time, and was referred by the Board of Directors to the Publication Committee for final action, was approved by that body at its April meeting. Because of the large number of organizations interested and the immense amount of detail involved, the Sectional Committee on Electrical Definitions found it necessary to postpone the issuance of its first report and arrangements have now been made to make this very extensive project available in report form during the first half of this year. Finally, the Institute has referred to ASA several of its existing standards and Reports on Standards which have reached the point where it would seem they were ready for action by the Electrical Standards Committee.

Simplified Practice Recommendation on Cupola Refractories

The Simplified Practice Recommendation covering cupola refractories has been mailed by the Division of Simplified Practice of the National Bureau of Standards to all interests in the industry for their consideration and written approval.

The Recommendation covers sizes and varieties of cupola lining, one and two-hole tap-out blocks, and slag hole blocks.

The Recommendation will be effective on announcement by the Department of Commerce that the required degree of acceptance has been received.

Alternate Representative Appointed on ESC

E. B. Paxton, General Electric Company, Schenectady, N. Y., has been appointed as alternate representative of the American Institute of Electrical Engineers on the Electrical Standards Committee.

The Value of National Standardization to American Industry[1]

by
John Gaillard, *Mechanical Engineer*
American Standards Association

American Standards help to effect savings in manufacturing; plant set-up for utilizing standards

Standardization as a coordinating function in industry has followed the changes in the character of industry itself. The old-time craftsman who fabricated and assembled all of the component parts of his product had little need for written standards and specifications. He was his own chief coordinator, although in an unconscious manner. Still, some remarkable examples of conscious standardization appear to have occurred in the course of past centuries. It is said that in the early Fifteenth Century the Republic of Venice insisted on having ships of uniform build and rig. Squadrons would then behave in the same manner under all weather conditions and could easily keep together. Also, the Venetian consuls at the various foreign ports were able—and were obliged—to maintain a supply of spare parts, such as masts and rudders, to secure rapid and accurate replacements. Evidently the service station idea is not new.

However, standardization really came into its own with the introduction of steam power. This meant in general the end of the home industry and of the production of complete products by one man or a small group of men. Instead of this, production became increasingly subdivided. While the ancient craftsman, working alone, made an entire cabinet, or a horse cart, or a set of armor, we find today that in the production of a certain type of sewing machine needle 24 men now perform the required series of operations.

Subdivision of a product into its component parts, and manufacture of these parts in large lots or continuous flow, is economical only if these parts can be readily assembled into the final product. To permit this, the component parts must be held to certain limits of accuracy, and here lies the source of a tremendous development in standard specifications. Not only the parts made in the several departments of one plant have to be harmonized, but also parts made by different companies—and finally, parts or sub-units made by entire industries. Ball and roller bearings, made by a special industry and used by builders of machine tools, automobiles, and electric motors, to mention only a few of the products in which these bearings are an essential part, are a case in point.

Standardization thus developed during the course of the last century to the point where it became a common problem of the entire nation. This appeared to be true particularly during the war, on account of the unusual need for coordination between different industries. The industries of the United States were not unique in this respect. During and after the war, a national standardizing body was established in each of 20 countries. There are now 21 altogether, including the British body, which dates back to 1901.

In the United States, a central body, the American Standards Association (first called the American Engineering Standards Committee), was set up by five technical societies—those of the mechanical, electrical, mining, and civil engineers, together with the American Society for Testing Materials. It now has about 40 member bodies. The main functions of the American Standards Association are to advance standardization as a means of national economy; to coordinate efforts made by industry to set up standards; and to approve as American Standards, standards that are shown to be acceptable to all major groups concerned. The rules of procedure of the American Standards Association are flexible so as to make it possible for any standard to be approved as an American Standard whenever it is deserving of being advanced to that status. The setting up of American Standards is left to industry itself. For example, technical committees of experts may be organized for this purpose. In giving its approval, the American Standards Association carefully ascertains whether the interests of all parties have been safeguarded. American Standards can easily be revised if and when changing conditions demand

[1] Paper presented at the Annual Meeting of the Local Section, American Society of Mechanical Engineers, Cincinnati, Ohio, May 12, 1932.

this—by the same methods used for establishing them. They will not, therefore, retard progress in their field.

Accomplishments under ASA procedure

What has been accomplished under the procedure of ASA and what benefits has American industry derived from it? This is, after all, what counts. So far, nearly 200 standards have been approved as American Standards and more than 150 are still in the making. However, a brief mention of certain projects will tell the story better than mere numbers. I shall more particularly refer here to work in the mechanical field.

American Standards for pipe threads and for coarse and fine screw threads as used on the common types of bolts and nuts have been set up and are generally used. Closely connected with these standards are those covering the bolts, nuts, and screws themselves.

A standard on fits between cylindrical parts was approved in 1925, and is now being reviewed in the light of progress made since that time.

One of the most important technical committees is dealing with cutting tools and machine tool elements. This committee has set up standards on tee-slots; on tool holders, shanks, and tool post openings; on milling cutters; and on taps with cut and ground threads. It is still working on other important problems, such as machine tapers and spindle noses for lathes.

Eight American Standards for pipe flanges and fittings made of steel, cast iron, and malleable iron have been developed, and the establishment of an American Standard for steel and iron pipe is making good progress.

A committee on transmission shafting has set up six standards for this kind of equipment, including different kinds of shafting keys. It has also developed a code for the design of transmission shafting.

A number of safety codes have been established for use in the mechanical industry, such as those for abrasive wheels and for foundry practice.

Another important standard, that on ball and roller bearings, covers the most commonly used types of radial bearings whose dimensions have become standard throughout the world. A proposed series of taper roller bearings is under consideration for adoption as an American Standard. It gives 58 sizes of bearings (heavy, medium, and light) which are intended to replace about 1,000 types and sizes now regularly made and stocked. There is a fair chance that this proposal also will lead to international uniformity.

American Standards have also been set up in the fields of civil, electrical, and mining engineering; in the chemical, textile, wood, paper, and petroleum industries; and for ferrous and non-ferrous metals. You will, therefore, realize how valuable a national fund of data has been built up. This fund is at the disposal of any individual or company which cares to avail itself of the opportunity. A pamphlet costing a few dimes contains the best national practice, from the combined technical and economic point of view, now available in the country. However, there is still more information which ASA holds at the disposal of industry. In its headquarters you will also find copies of about 10,000 standards approved by the 20 foreign national standardizing bodies. Thus, ASA is able to supply an American manufacturer at short notice with definite information about dimensions of German pipe flanges, or Swedish fits especially recommended for machine tool practice, or ratings for hydraulic turbines used in Czechoslovakia, or again, on British steel roller chains and chain wheels.

Membership of ASA in the International Standards Association (headquarters in Basle, Switzerland) gives ASA a very close contact with foreign developments—without, however, any formal commitments, to adopt any standard that is not strictly acceptable to American industry. More than 30 international projects are now in course of development, and for one of these—Nomenclature and Methods of Test of Petroleum Products—the American Standards Association holds the secretariat.

Use of standards important

ASA does not consider its task as completed when a standard has been approved as an American Standard. Not the establishment of the standard but its use in practice is the ultimate goal. To reach this, ASA has to maintain a close contact with as many companies as possible, companies being considered, in this respect, as the units of which industry is built up. Viewing the situation from the standpoint of the companies, the interesting question arises—How are companies organized to get the full benefit from American Standards developed under ASA procedure? The ideal situation would be for each company to have a direct contact with ASA, or at least a semi-direct contact, for example, through its trade association. This is comparable to the telephone field, where a central station will give the best service to the community if the largest possible number of people are connected with the central station either directly or through a station in their own building.

An analysis of the situation shows that in respect

to their relations with ASA, companies may be classified into three groups. Before discussing this classification, I should like to refer again to the craftsman of a few centuries ago. We saw that his centralized industry was not able to withstand the centrifugal force due to the speed of the machine age. It exploded, with the result that component parts were made in decentralized points. But there is something else that was exploded by the power age. The old craftsman was his own designer and production manager as well as his own purchasing agent, inspector, sales manager, and perhaps research man and testing expert. Also, he was his own standards department, in that he kept harmony between all of these functions.

Now, where did standardization land after all of these functions had been scattered? Sometimes it became the function of a special department. Here, we have class one—companies with a standards department. In other cases, standardization became the object of the special attention of a single individual in a company, say the chief engineer, or the production manager, or the purchasing agent. This is class two—companies where personal interest in standardization is shown by one, or a few, individuals but where standardization has not come to be recognized as a distinct function of management. The correspondence received by ASA shows this every day. Finally, there is a third group of companies, where standardization does not seem to have found a place in anybody's mind. Yet, companies in all of the three groups benefit by American Standards due to the close interlocking of the branches of modern industry. Even though no American Standard directly affecting the business of a specific company may have been established, this company will benefit in some way by the standardization work that has been embodied in a component part of a machine it is using, or in the electric motors that drive its equipment, or again, in the increased safety of its workers.

In trying to "sell" standardization to companies that are only mildly or not at all interested in it, the most powerful argument that can be used consists in showing that standardization pays. Standardization is a technique which may be introduced, by expert methods, just as a new piece of machinery may be installed and will bring savings in the course of time. One of the favorite questions I like to submit for the consideration of those who are not yet convinced of the benefits of standardization is this: Would it not be a good investment to have, as a modest start, just one man in the company study the possibilities of applying standardization to the company's business? In many cases, a survey of existing conditions will bring surprising results. One company manufacturing a special kind of machinery used in the paper industry found that in the course of years no less than 1,000 different bevel gears for a transmission ratio of one to one had been designed and made. Making allowance for necessary differences on account of varying speeds and loads, you will realize that a relatively small number would have been sufficient, with consequent large savings on patterns, storage space, design, drawings, and last but not least, through the possibility of making the gears in larger lots. Speaking about lot sizes—a survey in another plant showed that more than 1,100 different pins were used for securing cams on shafts of the machinery built by the company. In the same plant, the cost of setting up a tool to make small parts of this kind was three dollars to six dollars, which gives a clear picture of the direct loss suffered through lack of standardization. The loss through confusion, lack of interchangeability, and excessive stock evidently was also considerable. Finally, the standardization of wood screws—resulting in a reduction in variety of 50 per cent—gave a saving of as high as $4,000 per year, although the plant in question was engaged in metal working. Turning away from the workshop for a moment, we find that the same company saved $7,500 per year by standardizing its office forms.

Use of American Standard screws results in savings

Standardization of bolts and nuts saved one large machine tool manufacturer $10,000 a year. As a counterpart to this example of an over-all saving, you may be interested in a detailed case. A large company using cap screws, nominal size one inch, paid between $50 and $70 a hundred. After these cap screws had become an American Standard, the price was reduced to nine dollars a hundred. Short runs are costly, but unavoidable so long as everyone indulges in ordering specialties. Another company found that it had in storage five different cylindrical pins of the same nominal size. Only one lot had been made in the most economical way —on an automatic machine. The cost of another lot was 400 per cent higher, simply as the result of the fact that no one was keeping track of matters which are relatively simple, but which do not take care of themselves. An automatic machine does takes care of itself, but only because it has standardization built into it. Why not then build standardization also into the organization?

Many savings due to standardization cannot be shown in dollars and cents. One reason for this is

that relatively the greatest improvement is obtained where standardization is introduced for the first time. The replacement of chaos by coordination will yield tremendous benefits, but as the original conditions did not permit of applying measurement to the company's business—for example, by means of standard cost accounting—the detailed results of standardization can only be guessed at. A better balance sheet is usually the only, though a convincing, argument.

Incalculable are also the great gains caused by reduced friction between cooperating groups, both inside and outside the company; the avoidance of confusion and errors; and the possibility and the facility of improving the existing conditions still more, all the time, when they have become measurable.

Since I have mentioned some examples of savings made by companies, it may interest you to hear of one striking example of savings made by the country at large.

Fire hose couplings can be screwed on to hydrants only if both kinds of parts have the same screw thread. In this simple form, the statement seems absurdly naive. Still, it is not so long ago that no less than *eight* different screw threads were found on the fire hose couplings in one city. Different cities seemed bound to have different hose couplings. It thus happened, during a great fire in Baltimore, that fire engines which were rushed to that city from New York, Philadelphia, and Washington were obliged to remain idle because their couplings did not fit the Baltimore hydrants. That was in 1904. In 1927, another great fire threatened Fall River, Massachusetts. It was bad enough, in that parts of six blocks were destroyed. But the probable total destruction of the city was prevented by assistance from about 20 neighboring cities all of which, like Fall River, had American Standard screw threads on their hose couplings.

The total annual loss in this country caused by fire is said to be about 500 million dollars and 15,000 human lives. Here is one of the cases where an American Standard has become not only a money saver, but also a great reliever of human misery, and it is gratifying to know that it has already been adopted by more than 3,900 cities and specified by law in five states (Oregon, Massachusetts, Texas, Maryland, and California).

One more thought in relation to fire hazard and lack of standardization—Why does a company, duly protected by an insurance policy against fire losses (which never may occur) stand for suffering losses that are bound to occur, year after year, through disregard of standardization?

The American Standards Association, created for the purpose of assisting industry in solving its standardization problems, is receiving a steadily increasing amount of interest from industry, but much remains still to be done. In order that it may be helpful, ASA asks first of all that industry place its problems before it, whether they are problems of the individual company or of the entire trade. In many cases, the solution may be readily available from our headquarters. Where the major problems of industry are concerned, ASA is in a privileged position, as the national clearing house for standardization in the United States, to get in touch with all groups concerned and bring them around the table. Standardization being not only a technical, but also to a great extent a human problem, this "getting around the table" very often is the most important step toward real cooperation and general agreement, to the ultimate benefit of all.

Whatever your relation to standardization work may be—whether you are a designer, a production man, or interested exclusively in the financial side of the company's business—you will be able to help the American Standards Association in many ways in its efforts to give service to American industry.

Railways Save on Paper Sizes

Savings made possible through consolidating printed forms and standardizing sizes and classes of paper stocks were reported by J. T. Van Horn, chairman of the Stationery and Printing Committee of the Purchases and Stores Division of the American Railway Association at the Annual Meeting of the Division on June 22 and 23 in Chicago, according to a report of the meeting published in the June 25 issue of *Railway Age*.

In his report, Mr. Van Horn says:

> "In line with the recommendation of former committees, the committee urged a survey of printed forms for the purpose of consolidating forms, where possible, and standardizing sizes and classes of paper stock used. Through the standardization of forms, as well as of other stationery items, one member line reduced its stationery and printing expense $130,612, or 22 per cent last year, after having made a reduction of $150,650, or 20.6 per cent the previous year. This is a total saving of $281,262 for the two-year period."

ASA PROJECTS

S.M.P.E. Requests National Standards for Motion Picture Industry

National standards for all phases of the technical equipment and operation of the motion picture industry, from the lighting and acoustics of studios to the projectors and screens of picture houses, have been requested by the Society of Motion Picture Engineers. In a letter to the American Standards Association, Alfred N. Goldsmith, president of the Society of Motion Picture Engineers, asks for the development of uniform national standards to avoid the danger of confusion and waste resulting from the establishment of conflicting standards by different groups within the industry. If the request of the Society is approved, a technical committee representing all branches of the industry will be organized under the procedure of the American Standards Association.

A memorandum accompanying the Society's request follows:

Standardization projects, such as this proposed project on motion picture standards, grow logically step by step. Topics which initially seem of importance turn out to be not particularly susceptible to constructive and useful standardization; other topics which would not be considered as suitable for standardization on preliminary consideration afterward develop into topics of major importance. In the following it is therefore possible only to consider the general field of motion picture activities (so far as they are of technological character) and to mention some of the topics which might be suitable for standardization. The list must be regarded as entirely tentative.

1. *Definitions.* The terminology of the motion picture field is confused at present. Such terms as "blimp," "zoom," "pan," "tilt," "projection angle," "wow," or "flutter," and the like, are used without any official recognition. This situation requires correction so far as is feasible.
2. *Film.* Measurement of characteristics of the base of the film, dimensions of the film and of its perforations, study of film shrinkage and permissible maximum shrinkage, photographic sensitometric tests, measurement and specifications of "safety film," standard width of film of various types, standard containers for film for storage and for transportation, together with methods of preservation of films (for archives, etc.).
3. *Studio.* The acoustic treatment and illuminating methods for studios doubtless would permit of a considerable degree of standardization, both as to nomenclature, measurement, and specifications. Great varieties of lamps are used which are designated, for example, as "spots," "baby spots," "rifle spots," and so on. Light-diffusing media are used which are known by a variety of colloquial terms but are not definitely specified, for example, and in what is known as "oil diffusion," and presumably a wide variety of characteristics can be obtained under the same name. The acoustic characteristics of studios have not as yet been specified in any precise form in many instances, nor has measuring equipment for the purpose been adequately considered. Passing on to studio equipment, we find:
4. *Cameras.* The amount of significant noise produced in these devices at certain definite distances and in certain definite directions (in free space), the tolerances in the dimensions of the various working parts, the tensions and pressures in various parts of the mechanism, the dimensions of the magazines and of the magazine hubs, the take up tension, and numerous other characteristics of cameras require study for possible standardization. The mode of mounting the lenses, the possibility of standardizing focal lengths and apertures of lenses for motion picture practice, standardization of shutter aperture, definition of tripod arrangements and nomenclature for devices permitting moving shots (traveling trains, and the like), require consideration. Measurement of the effectiveness of camera-silencing inclosures is required.
5. *Recording equipment.* Microphones, amplifiers, acoustic reflectors, recording equipment, and sound track measuring equipment fall under this heading. Numerous characteristics of these devices are measurable, might be specified to advantage, and may ultimately be suitable for standardization.
6. *Re-recorders.* These are used for the introduc-

tion of modification of sound effects, and are rapidly becoming an important part of the studio technic. They are used for recording from 35 mm. film to 35 mm. film; and are now being produced as well for re-recording from 35 mm. film to 16 mm. film. The over-all frequency and volume characteristics of these devices, the amount of acoustic distortion that they produce, and certain other factors are of major importance.

7. *Photographic printing equipment.* Classification of types of equipment of this sort (continuous and step printers, optical reduction printers, contact printers). Permissible speed variation. Definition of maximum desirable operating speed. Specification of illumination of the printing surface.
8. *Laboratory Processes.* The development of film is now carried out in various ways by automatic machinery. The terminology requires study and certain of the processes require precision measurement and definition. For example, methods of measuring developer concentration or speed, measurements of the effectiveness of processes for "hardening," or otherwise preserving film, and the like.
9. *Exchange Equipment.* Films, after being returned from the theater, pass to the exchange where they are inspected. Inspection methods have never been definitely specified or defined. Dimensions and mechanical specifications, as well as strength tests of reels and containers used by exchanges require consideration, both for nitrate and safety stock.
10. *Theater Equipment.* Projectors have numerous dimensions requiring standardization. The tension and pressure at various points of the mechanism, magazine dimensions, safety devices, contrivances to protect the projectionists' eyes from undue glare, take-up tension, and the like, may all be considered for standardization. Screens (both of the continuous type and of the perforated "sound-transmitting" type) merit study for standardization of their reflection characteristics and specifications thereof. The re-surfacing of screens as they become warped brings up a similar series of problems. The amplifying and loud speaking equipment gives rise to the usual series of electro-acoustic standardization problems ending with the frequency characteristic, distortion characteristic, and space distribution of the output of the loud speaker system.
11. *Miscellaneous.* Such fields as color photography require study. The various processes have never been satisfactorily defined nor have the various forms of cameras, lenses, processing equipment, and projectors been put on a suitably precise basis. Three-dimensional pictures require definition. Frequency systems which give perspective impressions are classified as three-dimensional or "pseudo-stereoscopic." A considerable amount of confusion exists here on terminology.

Proposed Standard for Foundry Patterns of Wood

Standard specifications for color marking of wood foundry patterns and core boxes have been submitted by the American Foundrymen's Association to the American Standards Association for approval as American Recommended Practice. Standard color markings provide the molder with correct information regarding location of cores, the surfaces to be machined, and what portions are filled where stop-off construction is used; and they insure preparation of the mold in the proper manner.

The specifications were developed by a joint committee organized by the American Foundrymen's Association some years ago. This committee was composed of two members from each of the following organizations: American Foundrymen's Association; American Society for Testing Materials; Institute of Metals Division of the American Institute of Metallurgical Engineers; Steel Founders' Society of America; National Association of Pattern Manufacturers.

In 1926 this joint committee approved a tentative draft of the standard, several thousand copies of which were published. The standard was also approved as a Commercial Standard by the Bureau of Standards and published with the designation CS19-30. The ASA project number for the proposed standard will be B50.

In submitting the standard the American Foundrymen's Association offered to act as sponsor and to be joint sponsor with the American Society of Mechanical Engineers if this Society so desires.

New Committee Members

R. K. Tiffany, Olympia, Washington, and B. M. Hall, Jr., Atlanta, Georgia, have been appointed to act as representatives of the American Society of Civil Engineers on the Sectional Committee on Methods of Rating of Rivers (A36).

Heating and Ventilating Engineers Request National Ventilating Standard

Following several years of comprehensive research and study to determine qualitatively the temperature, the humidity, and the other factors required for the health and comfort of the occupants of buildings, the American Society of Heating and Ventilating Engineers has requested the establishment of a national standard for ventilation under the auspices of the American Standards Association.

Recommendations made by the Standards Committee of the Society were submitted as a basis for the establishment of a national standard. One result of the recommendations would be a marked lowering of fuel bills through the reduction of the minimum amount of outside air required to ten cubic feet per minute for each occupant. The recommendations cover the control of six essential factors in ventilation. These are temperature, humidity, air quality, movement, distribution, and quantity.

The Society's request for a national standard follows:

"After two years' work on the preparation of Standards for Ventilation aimed to promote the comfort and well-being of the occupants of buildings, the American Society of Heating and Ventilating Engineers wishes to submit the report of its Committee on Ventilation Standards as a basis for the development of an American Standard Code for Ventilation under the auspices and procedure of the American Standards Association.

"Because of the fundamental importance of ventilation to comfort and health, a uniform national code, based upon sound engineering and physiological principles, will be an invaluable instrument for the medical profession, insurance companies, public health authorities, and governmental agencies in the promotion of health measures. It will be equally important to industry and to the general public.

"The Committee has produced a brief and concise set of regulations intended to set forth clear and definite standards of Ventilation, representative of what the Society believes would properly serve the requirements of human health and comfort in the light of its experience, its study, and its research activities.

"The Society does not feel that its Committee has produced a perfect instrument but believes that it has performed a long neglected duty and has produced something that can be submitted to all interested in the subject as a basis for discussion.

"It should be distinctly understood that the Society does not intend to concern itself with the promoting or passage of ventilation laws in the different states but it proposes these Standards of Ventilation for the use of individuals or others interested in promoting laws, building codes or health regulations with some assurance that they have scientific support.

"The value of having a uniform standard is fully recognized by the Society and that there is widespread interest in this subject is evident. In bringing these Standards before you it is our hope that you will be able to enlist the cooperation and support of other engineering bodies, industrialists, governmental agencies, and the medical profession and others vitally concerned with human health and comfort.

"It will be our pleasure to cooperate with any of the groups that you may designate in the development of and perfection of ventilation standards under ASA procedure."

Standard for Electrical Equipment in Metal Mines

The American Standards Association has approved, as American Recommended Practice, Safety Rules for Installing and Using Electrical Equipment in Metal Mines (M24-1932). This standard was developed by a sectional committee under the sponsorship of the American Mining Congress. In the period of three years during which the sectional committee has been engaged in preparing this standard four drafts were approved and circulated.

The new standard contains detailed provisions covering approved methods for the installation and operation of electrical equipment in and around metal mines. Among the topics covered the following may be noted: general supervisory requirements; stationary electrical equipment in buildings, enclosures, and also underground; portable electrical equipment; circuits and conductors for both stationary and portable equipment; and a section defining the terms used in the text of the standard.

F. L. Stone of the Industrial Engineering Department, General Electrical Company, Schenectady, has served as chairman of the sectional committee, and J. M. Hadley, formerly of the American Mining

Congress, Washington, D. C., as secretary.

Copies of this standard will be available shortly and may be ordered from the American Standards Association.

Foreign Standards Available from ASA

New foreign standards available to Sustaining Members for loan or purchase through the ASA office are listed below. They are available in the language of the country under which they are listed. In requesting copies of the standards it is necessary to list only the ASA serial numbers preceding the titles. Send either a post-card or a note containing only the name and address of the person wishing to receive the standards, and the numbers of the standards desired. The card or envelope should be addressed to the American Standards Association, 29 West 39th Street, New York.

ASA Serial Number

Holland

207. Stop tap for water supply, body
208. Stop and bib tap for water supply, cover gland and washer
209. Stop and bib tap for water supply, valve spindle and crutch
210. Symbols for units
211. Weights of paper of standard sizes, per m2 and per 1000 sheets

Czechoslovakia

212. Aluminum, designations, classification, recommended practice for chemical analysis
213. Drawn steel wire, wire pins and staples
214. Porous glazed wall tiles
215. Stoneware floor tile
216. Sampling of coal

Germany

217. Clincher rims for motorcycles
218. Low pressure tires
219. Rims for pneumatic tires
220. Well base rims for motorcycles
221. Rolled round steel rods for reinforced concrete

Sweden

222. Cotter pins
223. Rail spikes
224. Track bolts
225. Spindle ends for milling machines
226. Tapered ends for arbors
227. Hand taps for pipe threads
228. Machine taps for pipe threads
229. Tapered hand taps for pipe threads
230. Clamping sleeves for screw-dies
231. Die stocks
232. Guide-socket for screw-dies
233. Screw-dies, metric threads (SI)
234. Screw-dies, pipe threads (SSP)
235. Screw-dies, Whitworth threads (BSW)

Great Britain

236. Bright square head set-screws (with flat chamfered ends) (BSW) (BSF)
237. Bright countersunk, round, and cheese head screws (BSW) (BSF)
238. Determination of the fusion temperature of coal ash
239. Dimensions of radio valves and valve-sockets
240. Doors (morticed, dowelled, and ledged and braced) for internal and external purposes
241. Five-inch and six-inch steel cased mortice locks
242. Graphical symbols for use in connection with interior electrical installations
243. Machine cut gears: helical and straight spur
244. Identification of chemical pipe lines
245. Portland-blast furnace cement
246. Railway rolling stock material, part 3: laminated, volute and helical springs, and steel for laminated, volute and helical springs
247. Terms used in illumination and photometry
248. Tractice armature direct-current neutral track relays
249. Train lighting accumulators (lead acid type)

Revised Scope for Methods of Testing Petroleum Products

The revised scope for the project on Methods of Testing Petroleum Products and Lubricants (Z11), the request for which was announced on page 221 of the July issue of INDUSTRIAL STANDARDIZATION, has been approved by the American Standards Association.

The revision, which was requested in order to bring the scope of the project into conformity with the scope of the new committee on nomenclature and Methods of Test of Petroleum Products of the International Standards Association, broadens the scope of the project to include nomenclature of petroleum, petroleum products, and lubricants, except for the materials excluded in the original scope of the project.

The American Society for Testing Materials, sponsor for the project, requested the change.